Overview of the Workshop on Recommendation in Complex Scenarios 2019 (ComplexRec 2019)

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Published in:
CEUR Workshop Proceedings

Publication date:
2019

Document Version
Publisher's PDF, also known as Version of record

Third Workshop on Recommendation in Complex Scenarios (ComplexRec 2019)

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ABSTRACT

Over the past decade, recommendation algorithms for ratings prediction and item ranking have steadily matured. However, these state-of-the-art algorithms are typically applied in relatively straightforward and static scenarios: given information about a user's past item preferences in isolation, can we predict whether they will like a new item or rank all unseen items based on predicted interest? In reality, recommendation is often a more complex problem: the evaluation of a list of recommended items never takes place in a vacuum, and it is often a single step in the user's more complex background task or need. The goal of the ComplexRec 2019 workshop is to offer an interactive venue for discussing approaches to recommendation in complex scenarios that have no simple one-size-fits-all solution.

CCS CONCEPTS

• **Information systems** → **Recommender systems**.

KEYWORDS

Complex recommendation

1 INTRODUCTION

Over the past decade, recommendation algorithms for ratings prediction and item ranking have steadily matured, spurred on in part by the success of data mining competitions such as the Netflix Prize, the 2011 Yahoo! Music KDD Cup, and the RecSys Challenges. Matrix factorization and other latent factor models emerged from these competitions as the state-of-the-art algorithms to apply in both existing and new domains. However, these state-of-the-art algorithms are typically applied in relatively straightforward and static scenarios: given information about a user's past item preferences in isolation, can we predict whether they will like a new item or rank all unseen items based on predicted interest?

In reality, recommendation is often a more complex problem: the evaluation of a list of recommended items never takes place in a vacuum. It is often a single step in the user's more complex underlying task or need and these additional factors often place a variety of constraints on the recommendation task. For example, standard algorithms typically work with user preferences aggregated at the item level, but real users may prefer certain features of items more than others or attach more weight to those features. Furthermore, a user's interest in an item may vary under different conditions or subject to the peculiarities of the underlying domain. Users may want combinations of multiple items, or recommendations on the sequence of consumption. Moreover, different users may want different information about items, so beyond ranking the system needs to decide which information best to display to each user. In addition, providing accurate and appropriate recommendations in such complex scenarios comes with a whole new set of evaluation and validation challenges. Offline datasets do not capture the complexities of online interaction effects related to different ways of presenting (sets of) recommendations, interaction options and developments of user needs, queries and other interactions throughout sessions. With online evaluation it is a challenge to capture relevant aspects of the user's current situation, task and context and to investigate interaction effects between complex sets of user and data features and interface options.

In general, relatively little research has been done on how to elicit rich information about these complex background needs or how to incorporate it into the recommendation process.

The current generation of recommender systems and algorithms are good at addressing straightforward recommendation scenarios, but recommendation under more complex scenarios as described above has not been fully explored. The **ComplexRec 2019** workshop addressed this by providing a interactive venue for discussing approaches to recommendation in complex scenarios that have no simple one-size-fits-all solution.

ComplexRec 2019 was the third edition of the workshop on recommendation in complex scenarios [5, 6]. The first two editions were held at RecSys 2017[1] and RecSys 2018[2]. In recent years, other workshops have also been organized on topics related to our workshop's focus. Examples include the CARS (Context-aware Recommender Systems) workshop series (2009-2012) organized in conjunction with RecSys [1–4], the CARR (Context-aware Retrieval

ComplexRec 2019, 20 September 2019, Copenhagen, Denmark

[1]Workshop website and proceedings available at http://complexrec2017.aau.dk/.
[2]Workshop website and proceedings available at http://complexrec2018.aau.dk/

and Recommendation) workshop series (2011-2014) organized in conjunction with IUI, WSDM, and ECIR [7, 9–11, 18], as well as the SCST (Supporting Complex Search Tasks) workshop series (2015, 2017) organized in conjunction with ECIR and CHIIR [13, 14].

2 TOPICS AND FORMAT

ComplexRec 2019 was organized as an interactive half-day workshop with short paper presentations and a keynote, with the aim of capturing a diverse set of aspects that contribute to complex recommendation scenarios. We therefore invited contributions to the workshop about topics related to complex recommendation, such as:

- **Task-based recommendation** (Approaches that take the user's background tasks and needs into account when generating recommendations)
- **Feature-driven recommendation** (Techniques for eliciting, capturing and integrating rich information about user preferences for specific product features)
- **Constraint-based recommendation** (Approaches that successfully combine state-of-the-art recommendation algorithms with complex knowledge-based or constraint-based optimization)
- **Query-driven recommendation** (Techniques for eliciting and incorporating rich information about the user's recommendation need (e.g., need for accessibility, engagement, socio-cultural values, familiarity, etc.) in addition to the standard user preference information)
- **Interactive recommendation** (Techniques for successfully capturing, weighting, and integrating continuous user feedback into recommender systems, both in situations of sparse and rich user interaction)
- **Context-aware recommendation** (Methods for the extraction and integration of complex contextual signals for recommendation)
- **Complex data sources and domains** (Approaches to dealing with complex data sources or data sources with unique characteristics in a specific domain or across several domain.)
- **Evaluation & validation** (Approaches to the evaluation and validation of recommendation in complex scenarios)

3 WORKSHOP SUMMARY

The half-day workshop consisted of two slots, with an introduction reviewing the complex scenarios presented in previous ComplexRec workshops, as well as six paper presentations and a closing keynote presentation by Christoph Trattner about the complex nature of online food choices and how this knowledge can be used to build novel food recommender systems [19]. Authors of accepted submissions were invited to give 15-minute presentations. Evaluation criteria for acceptance included novelty, diversity, significance for theory/practice, quality of presentation, and the potential for sparking interesting discussion at the workshop. All submitted papers were reviewed by at least three members of the Program Committee.

The workshop closed with a brief discussion on future directions for research on complex recommendation scenarios.

3.1 Keynote

Christoph Trattner described the challenges of providing recommendations in the domain of food, touching on questions of how people make their food choices online, how we can model and predict this behavior, and whether recommender technology can help people change their behaviour towards making healthier food choices by recommendation healthier alternatives to meals they like.

3.2 Accepted Papers

The six accepted papers cover a broad set of complex recommendation scenarios.

Revina and Rizun [17] presented a concept of a multi-criteria knowledge-based recommender system that provides decision support in complex business process scenarios. It utilizes aspects of stylistic patterns, business sentiment and decision-making logic extracted from the unstructured texts, and predicts process complexity and thereby modifies decision support ranging from minimal to full automation.

Doan and Sahebi [12] introduced a hybrid model that jointly models user ratings and reviews across multiple domains, where knowledge of a user's preferences and interests in one domain is used to recommend items in another domain. It supports decisions by generating review-like sentences according to user interests and item features in more than one domain, with experiments showing improved transfer of review information.

Collins and Beel [8] provided an analysis of using meta-learning to choose the best recommender algorithm for scholarly article recommendation per individual session and query document. They performed both offline and online evaluations, that show that engagement and click-through rate can be significantly improved by selecting the appropriate algorithm based on the user's currently selected document.

Yang et al. [20] proposed an advice recommender system that analyses complaint data to recommend web page that contain advice relevant to user dissatisfaction. The system extracts company names, complaint topic words and advice topic words from negative reviews, and constructs a query from these elements to retrieve and recommend web pages that offer advice relevant to the review.

Murgia et al. [15] discuss the complexities of recommending for young children in the context of education. They identify seven layers of complexity that recommender systems need to take into account, including the different developmental stages that children can be in and move through at different speeds, the multiple other stakeholders in the process like parents and teachers, the importance of ethics, the fostering learning, providing explanations and the challenges of assessing what makes a good recommendation.

Naveed and Ziegler [16] focused on the problem of providing feature-driven explanations from hybrid recommenders that the user can interact with. A user-feature model is learned from user preferences and item features in the domain of digital cameras, which is then used to provide recommendation and explanations. The user can interact with the recommendation by choosing feature-based explanations, and by (de)selecting features to use in generating new recommendations.

4 WEBSITE & PROCEEDINGS

The workshop material (list of accepted papers, invited talk, and the workshop schedule) can be found on the ComplexRec workshop website at http://complexrec2019.aau.dk. The proceedings are available as a CEUR Workshop Proceedings volume, a link to which can be found on the workshop website. A summary of the workshop will appear in SIGIR Forum to increase cross-disciplinary awareness of recommender systems research. In addition, we aim to explore the possibility of publishing a special journal issue on recommendation in complex scenarios, collecting the best authors and papers of the 2017-2019 editions of the workshop.

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